Electrometer Readings—Continued.

Time.	November 3.			November 12.		
	Monument.	Signal Office.	Difference.	Monument.	Signal Office.	Difference.
	Volts.	*Volts.*	*Volts.*	*Volts.*	*Volts.*	*Volts.*
1.30 p. m	900	216	684	1350	84	1266
1.32 p. m	888	246	642	1750	72	1678
1.34 p. m	900	216	684	450	30	420
1.36 p. m	862	246	616	225	18	207
1.38 p. m	875	240	635	— 50	12	62
1.40 p. m	825	222	603	— 50	6	56
1.42 p. m	862	270	592	— 50	0	50
1.44 p. m	900	180	720	300	18	282
1.46 p. m	888	216	672	875	42	833
1.48 p. m	900	240	660	.....	48	.....
1.50 p. m	912	204	708	0	18	18
1.52 p. m	862	210	652	— 250	— 12	238
1.54 p. m	850	228	622	— 150	— 6	146
2 p. m	875	210	665	1000	30	970
2.05 p. m	775	210	565	1250	12	1238
2.10 p. m	850	234	616	— 500	— 30	470
2.15 p. m	825	204	621	— 750	— 54	596
2.20 p. m	800	210	570	825	6	819
2.25 p. m	800	246	554	1500	0	1500
2.30 p. m	750	240	510	875	42	832
2.35 p. m	750	288	462	— 375	— 30	545
2.40 p. m	750	288	462	— 750	— 48	702
2.45 p. m	.....	252	.....	1000	6	994
2.50 p. m	700	300	400	— 100	— 54 — 84	46 16
2.55 p. m	700	228	572	— 200	— 42	158

The total difference between the values at the two stations for 79 observations, on November 3d, the bright, fair day, is 62,992 volts, or for a difference in altitude of 455 feet, an average difference in the value of the potential equivalent to 797 volts, or nearly 800 volts. For November 12th the sum of the differences in value of the potential at the two stations for 77 observations is 37,231 volts, or an average difference of 483 volts—for the same difference of 455 feet. It may be interesting to compare these values with those given by observations at other times. In the MONTHLY WEATHER REVIEW for October, 1886, are given the values obtained on different dates. The means of those observations are for October 4th, from 48 observations, 398 volts; on October 5th, from 38 observations, 210 volts; on October 7th, from 40 observations, 333 volts.

It will be noticed that the curves for the lower station seem to lag a little, compared with the curves for the upper, regarding any sudden fluctuation in either direction. It is proper to mention that all care was taken to have the observations made synchronously. Of the regular observations, the highest positive values occurred on November 20th, all four observations averaging over 500 volts, the weather being clear with slight haze and light southerly winds. The next highest value occurred on November 5th, at 11 a. m., being almost 500 volts. The highest negative values occur on November 12th, at 11.40 a. m., during heavy rain, and on November 25th, at 3 p. m., during heavy rain.

At Baltimore, Maryland, a continuous record for the month has been obtained. The following is from the observer's report: "The month has been one of rather more than usual electrical disturbance; variations are shown on many sheets, preceding and accompanying rain." There is a very close correspondence in the character of the curves at Washington and those at Baltimore, on November 12th, during the rain previously referred to; the Washington curve, however, seems to lag about 45 minutes behind the curve for Baltimore.

At New Haven, Connecticut, negative indications are recorded on five dates, as follows: November 6th, during rain; November 10th, during light rain; November 12th, during rain, preceded by low positive; on November 17th, at 9 a. m., during light rain, the remaining observations being positive, although the rain continued; November 23d, the highest negative value, 116 volts, in the morning, the observations for the rest of the day being positive, although the rain continued, turning in the afternoon to fog. On November 25th light rain was accompanied by low positive. On November 25th light rain was accompanied by low positive. On November 18th light rain was accompanied by positive values as low as 0.2 volt. The highest positive values occur on November 2d and November 5th, 77 volts, and on November 27th, 66 volts, during clear weather. On November 12th, that being considered as a term day, we find at New Haven, at 9 a. m., a positive indication, in value 9 volts; at 11 a. m., 11.9 volts; at 1 p. m., 5.3 volts; at 3 p. m., 39.4. Rain began at 1.03 p. m., continuing all day, the next day, November 13th, being cloudy and threatening, the values for this date were 6.2 volts at 9 a. m., 1.3 volts at 11 a. m., 1 volt at 1 p. m., and 2.5 at 3 p. m.

At Boston, Massachusetts, a very complete and valuable set of observations has been made. Rain began November 6th at 11.50 a. m., accompanied with positive values. In this case the electrometer gave no indication of the approach or disturbing effect of rain. On November 10th rain began at 1.30 p. m. At 11 a. m. the values were negative, 75.8 volts; at 1 p. m., 59.2 volts, and at 3 p. m., during the rain, positive, 29.0 volts. On November 13th rain all day was accompanied by low positive values. On November 17th rain was accompanied by high positive values; November 18th threatening weather and rain, accompanied by very high positive values, averaging 345 volts, throughout the day. High positive values continued until the 23d, when rain all day was accompanied by low positive values. On November 25th rain in the morning was accompanied by low positive, and rain in the afternoon by high negative. After the rain very high positive values are recorded. A negative indication occurred on November 15th at 9 a. m., the weather being clear, and no apparent meteorological disturbance in connection with it. The highest positive values obtained during the month were on November 2d in the morning, and November 28–29th.

The observations on November 12th are as follows: At 9 a. m. positive, 129 volts, the weather cloudy; at 11 a. m. positive, 248, the weather fair; at 1 p. m., positive, 160, the weather cloudy; at 3 p. m., positive, 135, the weather cloudy. On November 13th, at 9 a. m., positive, 14 volts, light rain; at 11 a. m., positive, 19, during light rain; at 1 p. m., positive, 37.2, during light rain. Light snow fell during the night and the next morning, clear and bright, the values were about 118 volts, positive.

At Ithaca, New York, a very full and valuable set of observations has been made. Negative values occur on November 6th, during cloudy weather, at 9 a. m., changing to low positive at 11 a. m., and negative, changing to positive, during the afternoon. Light rain began at 12.30 p. m., changing to snow at 1 p. m. During this snow the readings varied, as follows: at 2.59 p. m., negative, 160 volts; at 3 p. m., negative, 121 volts; at 3.01 p. m., negative, 35 volts; at 3.02, positive, 50 volts; at 3.04 p. m., positive, 400 volts; at 3.06, positive, 755 volts; at 3.08 p. m., positive, 855 volts.

On November 11th, low positive at 1 p. m., changing to low negative, with light rain from 1.30 to 2.30 p. m. On November 12th, low positive at 9 a. m., with negative values at 11 a. m. Light snow began at 11.30 p. m.; negative values at 1 p. m., and positive values throughout the rest of the afternoon, during light snow, which continued throughout the next day. Very high positive potentials, about 1,800 volts, were obtained during this snow. On November 14th, after the heavy snowfall of the two days preceding, negative values were obtained during clear weather. On November 15th, at 3 p. m. negative values during clear weather. On November 17th, high negative values throughout the day during light rain. In addition to the date already mentioned snow fell on November 7th and 19th, with positive values. On November 16th the needle was observed to oscillate considerably.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various states and territories during the month, as follows:

Arizona.—Fort Grant, 4th; Fort Apache, 4th, 9th, 11th, 17th, 19th; Yuma, 11th; Prescott, 11th, 18th.
Arkansas.—Lead Hill, 7th.
California.—Fall Brook, 6th; Los Angeles, 11th, 18th; San Francisco, 16th, 17th, 19th.
Connecticut.—North Colebrook, 16th.
Dakota.—Fort Totten, 24th, 28th, 30th; Fort Meade, 25th; Fort Buford, 30th.
District of Columbia.—Washington City, 13th, 21st.
Florida.—Sanford, 10th, 19th; Archer, 19th.
Georgia.—Augusta, 20th.
Idaho.—Boisé City, 5th.
Illinois.—Riley, 1st, 16th, 19th, 20th, 26th, 29th; Chicago and Charleston, 16th.
Indiana.—Indianapolis, 5th, 16th; Laconia and Sunman, 16th; Logansport, 27th; Vevay, 28th.
Iowa.—Cresco, 6th, 19th; Monticello, 15th, 27th; Independence, 24th; Cedar Rapids, 24th, 26th.
Kansas.—Wyandotte, 1st, 4th, 5th, 7th, 9th; Yates Centre and Independence, 7th; Salina, 9th; Leavenworth, 19th; Manhattan, 28th.
Kentucky.—Frankfort, 20th.
Maine.—Cornish, 6th, 12th, 28th.
Massachusetts.—Blue Hill Observatory, 2d, 6th, 12th, 16th, 30th; North Truro, 3d, 12th, 13th, 20th, 30th; Amherst, 4th, 16th; Milton, 6th; Somerset, 6th, 12th, 16th, 28th, 30th.
Michigan.—Mottville, 1st, 5th, 16th; Lansing, 12th, 16th; Marquette, 16th; Alpena, 19th; Escanaba, 25th.
Minnesota.—Moorhead, 15th, 16th, 23d 24th, 25th.
Missouri.—Saint Louis, 8th; Centreville, 10th, 22d.
Montana.—Poplar River, 3d, 14th, 30th.
Nebraska.—Brownville, 20th.
New Jersey.—Clayton, 15th.
New York.—Oswego, North Truro, and Palermo, 16th.
North Carolina.—New River Inlet, 2d, 5th, 12th, 17th, 21st, 24th.
Ohio.—Elyria, 2d; Wauseon, 2d, 3d, 6th, 15th, 26th.
Oregon.—East Portland, 3d, 4th; Albany, 16th; Roseburg, 16th, 26th.
South Carolina.—Stateburg, 3d; Spartanburg, 19th.
Tennessee.—Nashville, 5th, 20th, 27th.
Texas.—Abilene, 12th.
Virginia.—Dale Enterprise, 2d, 3d; Variety Mills, 2d, 3d, 11th.
Wisconsin.—Manitowoc, 15th; Delavan, 15th, 20th, 26th.
Wyoming.—Fort Bridger, 18th, 24th.

LUNAR HALOS.

Lunar halos were observed in the various states and territories during the month, as follows:
Alabama.—Mobile, 2d, 5th, 10th.
Arizona.—Maricopa, 3d, 6th; Yuma, 3d, 10th; Fort Grant, 3d, 11th; Willcox, 7th, 11th; Fort Apache, 7th, 11th, 12th, 19th; Prescott, 8th, 9th, 11th, 12th.
Arkansas.—Lead Hill, 7th.
California.—San Francisco, 5th; Fort Bidwell, 10th; Oroville, 15th; Keeler, 17th.
Colorado.—Las Animas, 4th, 6th.
Connecticut.—North Colebrook, 3d; Bethel, 3d, 5th; New London, 9th, 12th.
Dakota.—Webster, 9th, 17th; Fort Totten, 10th, 11th; Bismarck, 10th, 14th, 15th.
Florida.—Pensacola, 2d; Cedar Keys and Manatee, 10th; Archer, 19th.
Georgia.—Forsyth, 7th, 20th; Augusta, 10th; Savannah, 13th.
Idaho.—Boisé City, 17th.
Illinois.—Springfield, 1st; Pekin, 1st, 3d, 11th, 18th; Riley, 1st, 5th; Chicago and Charleston, 16th.
Indiana.—Vevay, 1st, 8th, 10th, 14th, 15th, 20th; Terre Haute, 8th; Butlerville and Indianapolis, 8th, 14th; Laconia, 16th.
Indian Territory.—Fort Sill, 10th.
Iowa.—Clinton, 2d, 12th, 16th; Muscatine, 11th.
Kansas.—Wyandotte, 4th to 7th, 9th, 13th, 16th; El Dorado, Globe, Emporia, Salina, West Leavenworth, and Wakefield, 9th; Westmoreland, 9th, 10th, 30th.
Kentucky.—Frankfort, 2d; Louisville, 8th; Richmond, 10th.
Louisiana.—Shreveport, 2d, 10th.
Maine.—Orono, 8th; Eastport, 12th.
Maryland.—Emmittsburg, 6th; Baltimore, 11th.
Massachusetts.—Deerfield, 3d, 5th; Blue Hill Observatory, Milton, and North Truro, 16th.
Michigan.—Kalamazoo, 3d; Alpena, 5th, 15th; Lansing, 11th, 15th; Mottville, 12th; Escanaba and Mackinaw City, 15th.
Minnesota.—Moorhead, 8th, 14th to 17th; Saint Vincent, 29th.
Montana.—Helena, 14th; Fort Custer, 17th.
Nebraska.—Marquette, 2d, 14th; Omaha and Genoa, 14th.
Nevada.—Carson City, 10th.
New Hampshire.—Nashua, 12th, 16th, 20th.
New Jersey.—Beverly, 2d, 3d, 5th, 10th, 11th, 13th; Moorestown, 2d, 3d, 5th; Clayton, 2d, 5th, 8th; Dover, 3d, 5th, 11th; Upper Montclair, 9th.
New Mexico.—Fort Stanton, 4th; Santa Fé, 5th.
New York.—Rochester, 2d; Albany, 3d; Buffalo, 8th; Palermo, 9th; Ithaca, 9th, 16th; Brooklyn, 11th; Oswego, 15th.
North Carolina.—New River Inlet, 3d, 25th; Smithville, 5th; Lenoir, 10th; Charlotte and Statesville, 10th, 14th.
Ohio.—Wauseon, 1st, 2d, 11th; Toledo, 1st, 2d, 11th, 15th; Garrettsville and Hiram, 2d; Elyria, 2d, 4th; Napoleon, 2d, 11th; Cincinnati, 14th.
Oregon.—Roseburg, 11th, 30th; Albany and Mount Angel, 13th; Linkville, 16th.
Pennsylvania.—Pittsburg, 2d; Philadelphia, 2d, 5th; Dyberry, 2d, 5th, 9th; Grampian Hills, 2d, 11th; Fallsington, 3d, 5th; Catawissa, 11th.
Rhode Island.—Block Island, 11th.
South Carolina.—Spartanburg, 2d, 9th, 20th, 29th; Charleston, 9th; Aiken, 10th.
Tennessee.—Nashville, 8th, 10th; Memphis and Milan, 10th; Chattanooga, 14th, 27th, 29th.
Texas.—Palestine, 6th, 7th, 9th, 10th; Fort Davis, 6th, 10th; New Ulm, 9th, 10th; Corsicana, 10th; El Paso, 11th; Fort Elliott, 20th.
Utah.—Frisco, 11th.
Vermont.—Brattleborough, 6th.
Virginia.—Rappahannock, 1st, 3d, 11th; Dale Enterprise, 2d, 3d, 5th, 15th, 21st; Bird's Nest, 2d, 9th, 10th, 11th; Lynchburg, 3d, 5th, 6th, 9th, 10th; Cape Henry, 10th, 11th; Chincoteague and Norfolk, 11th.
Washington Territory.—Bainbridge Island, 10th; Port Angeles, 15th; Tatoosh Island, 17th.
Wisconsin.—Delavan, 5th, 6th, 15th; Beloit, 5th, 15th, 30th; Green Bay and Milwaukee, 15th.
Wyoming.—Fort Bridger, 13th, 14th, 18th.

The phases of the moon (Washington mean time) during November, as given in "The American Ephemeris and Nautical Almanac" for 1886, are as follows: New moon, 25th, 2 h. 10.3 m.; first quarter, 2d, 23 h. 57.0 m.; full moon, 11th, 1 h. 58.3 m.; last quarter, 18th, 5 h. 32.2 m.; apogee, 5th, 1.4 h.; perigee, 20th, 14.2 h.

MIRAGE.

Mirages were observed at the following stations:
Webster, Dakota, 11th.
Richardton, Dakota, 17th.
Salina, Kansas, 6th, 8th, 9th, 13th.
Marquette, Nebraska, 17th to 20th.
Reidsville, North Carolina, 14th, 18th.

MISCELLANEOUS PHENOMENA.

DROUGHT.

Mobile, Alabama: light rain fell during the 9th and 10th, breaking one of the severest droughts ever experienced in this